

Investigation of Job Satisfaction Dimensions of Health Care Knowledge Workers: Factor Analysis - Multivariate Approach

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Abstract

The investigation of the job satisfaction dimensions is crucial before further analysis such as testing the research hypotheses. The widely used approach includes Exploratory Factor Analysis with principal components analysis, unweighted least squares, generalized least squares, maximum likelihood, principal axis factoring, alpha factoring, and image factoring. The study focuses on investigation of the underlying dimensions of the job satisfaction of the knowledge workers in healthcare using multiple methods. The target sample of the research is the health care personnel including nurses, administrators, and doctors as the knowledge workers. Toward this end, a theory-based classical approaches are utilized. Healthcare employee's job satisfaction is an important in the successful performance of institutions. A rich literature of academic studies has showed that personnel's satisfaction is critical for the successful performance of organizations. The dimensions healthcare workers' satisfaction as the knowledge workers were extracted by employing: (i) Exploratory Factor Analysis method, (ii) Confirmatory Factor Analysis. The sample of this study were collected via a survey from health care personnel as knowledge workers. There are 249 observations collected from healthcare workers. A set of 34 items are utilized to investigate the job satisfaction of the healthcare knowledge workers. The results of the factor analysis indicated that six underlying crucial factors are extracted: attitude of management, organizational support, job security, reward and pay, working conditions, attitude of colleagues.

Key words: Healthcare, Factor Analysis, Knowledge worker, Job satisfaction.

Jel Codes: B4, B41, B49, C10.

1. Introduction

In recent years, employee satisfaction has become a major focus. Many companies have invested significant resources into programs to monitor and enhance employee satisfaction (Morris, B., 1998). Job satisfaction has been defined as an emotional state such as satisfaction with other living spaces and individuals (i.e., civil satisfaction), but job satisfaction is also a behavioral pattern that reflects one's assessment of their work. The emotional aspect is generally emphasized less than the cognitive aspect (Ilies and Judge, 2004) in measuring job satisfaction. Various definitions of job satisfaction, employee satisfaction, job satisfaction and general satisfaction are available in the literature. Employee satisfaction has also been defined as the level of liking the work of fellow employees or workers; job satisfaction is defined as people's feelings about their work as well as the different aspects of their work (Spector, 1997). Job satisfaction has also been referred to as a positive emotional state resulting from the evaluation of one's work or work experience (Locke, 1969).

Attitudes regarding job satisfaction are formed through emotional attitudes and thoughts about work and organization, since it is a function of the relationship between what a job-satisfied individual wants from his job and what he or she perceives (Locke, 1969). On the other hand, overall satisfaction is considered as positive or negative judgments regarding people's work or business environment (Weiss, 2002). Job satisfaction represents a general attitude which includes both the cognitive appraisals of employees and their feelings about the general situation. Although "general satisfaction" is not mentioned in the literature, job satisfaction is seen as multi-dimensional. The concept of satisfaction is linked to various business dimensions (Anderson, 1984). In Anderson's (1984) study, five job dimensions, being skill diversity, job identity, commitment, autonomy, and job feedback, were associated with job satisfaction at a significant level. But Anderson has shown in his study that the relationship between skill diversity and job satisfaction is not entirely clear. In addition, Teas (1981) found a positive relationship between employee job satisfaction, performance feedback, and other job dimensions.

Employee satisfaction affects organizational performance similarly as customer satisfaction. Employees are the internal customers of the operator; they form the current working environment and are willing to cooperate with the business community to achieve business goals. Job satisfaction has been found to significantly affect job performance in the working environment, absenteeism, and psychological distress. Dissatisfied employees tend to waste too much time on the job, and tend to be absent. Job satisfaction can thus be linked to performance, organizational efficiency and other issues. Employee satisfaction can therefore increase productivity, reduce staff turnover, and increase creativity and loyalty (Dickter et al., 1996). Therefore, the issue of employee

satisfaction should not be ignored, yet few businesses have seriously considered employee satisfaction (Syptak et al., 1999).

The motivation of this study is that the adapted scale (Zaim and Zaim, 2007) for the job satisfaction does not distinguish the underlying dimensions in the health care sector. The job satisfaction of the health care employees as the knowledge workers are crucial in this sector (Mengistu and Bali, 2015; Kolo, 2018). It is particularly a crucial topic to investigate during and after the COVID-19 (Zhang et al., 2020)

2. Literature Review

2.1. Definition of Knowledge Worker

There are many different approaches to the definition and scope of the information worker. These approaches intersect at the point of mindwork and service production, as opposed to bodywork and goods production. The term "knowledge work" known as "white-collar work" is a relatively new concept. It was first used by Drucker (1959), who described "Knowledge workers (KW)" as workers who work non-physically, or with non-physical resources. Kelloway (2000) defines information work as workers who produce, share, and use information in daily life such as information production, implementation, delivery and acquisition. In recent years, KW has been defined as high-level employees who apply theoretical and analytical knowledge acquired through structured training to develop a new product or service. However, KW has also been expressed as those who are employed in tasks using or developing knowledge for the struggle for survival. In considering the direction of this alternative dictionary definition, the tasks of an information worker include important factors such as planning, obtaining, researching, analyzing, organizing, storing, programming, distributing, marketing, decision making and information transformation in order to obtain the final product. According to this definition, people working in professions such as managers, engineers, accountants, lawyers, financial experts, system analysts and programmers can be regarded as information workers (Horvath, 2006). Finally, Ersel (2003) defines information workers as workers who engage in the production, collection, storage, analysis and coordination of information. The concepts of knowledge worker and knowledge worker are still not completely defined. "Knowledge work" can be understood from a very broad perspective, going from the writing of a software to advertising the software. Some of us may call ourselves knowledge workers.

Although there are some potentially significant differences between knowledge workers and physical workers, there are also structures with common characteristics of these two groups of workers (Drucker, 1999). For example, there is a continuity between the physical workers (blue-

collar) and the knowledge workers, and many jobs require the efforts of both groups of workers. Knowledge workers are defined as "technologists" who do both hand work and knowledge work; they may be the largest and fastest growing group of knowledge workers.

2.2. Knowledge Work and the Characteristics of the Knowledge Workers

It has been stated that knowledge is a competitive weapon in today's society which is more valuable than natural resources, factories, and money (Stewart, 1997). In this new century, it has been emphasized that wealth is the product of information. Nowadays, knowledge is the main raw material and basic product of the economy. Therefore, knowledge work is complex and employees involved in this work must have certain skills and talents, real and theoretical knowledge and familiarity with the field in which they are employed. These employees are required to be able to find information, access information, recall information and apply information. In addition, knowledge workers should interact well with other employees while having the ability and motivation to acquire and develop these skills. Although these features can vary from job to job, knowledge workers must have these basic qualifications (Prince, 2021). Many jobs require more university diplomas than ever, and many knowledge workers are lacking in this respect.

Everyone knows that knowledge workers must have certain qualifications, which is emphasized. For example, Kelley (1990) defined knowledge workers as "golden-collar workers" and stressed that knowledge workers are hired because they have attributes such as problem solving, creativity, talent and intelligence. Kelley also pointed out that knowledge workers are very important for the purpose of continuing the existence of the institution in the information age, because they can turn knowledge into money. The reason that knowledge workers are called "gold-collar" is that they must have the ability to transform an important value to survive (Saravananmuthu, 2004). In other words, knowledge workers collect information, process, analyze and disseminate information because they are identified as gold-collar workers. In addition, the main objective is to establish the data and information processing capacities of information technology and the coexistence of the creative and innovative capacities of people working on this field. Therefore, knowledge workers must be skilled at implementing new technology. More importantly, knowledge workers must have the capacity to decide whether or not their "best practices" are compatible with the dynamics of the business environment. Given the need for autonomy in learning and decision-making, information workers also need to be comfortable with self-regulation and self-learning (Malhotra, 1998). Information workers must have a certain capacity and ability to act entrepreneurially, since they are endowed with responsibilities and entrusted with authority with which to fulfill them.

The main characteristics of knowledge are listed (Lang, 2001): It cannot be defined easily. Limits and stopping rules are unclear. In any particular case, complex judgments are required for problem identification Which include strong ethical, political and professional dimensions. There are no right or wrong solutions, only good or bad ones. Ready solutions cannot be kept available, but specific solutions must be discovered. Repetition or experimentation is always kept in mind. Since knowledge is interdisciplinary, difficult problems can often be solved only through consultation between team members who will negotiate, debate, and reconcile different perspectives.

2.3. Factors Affecting Satisfaction of Knowledge Workers

There are various studies on the factors affecting the satisfaction of information workers. It was determined by researchers that these factors differed from factors that affect the satisfaction of workers in other occupations. Narang (2010) has developed models that claim to be a reliable and valid scale for measuring the satisfaction of information workers. In this study, the factors affecting the satisfaction of information workers were examined within five dimensions: organizational support, competitive excellence, oppressive management practices, fair and transparent management, supervision and guidance. This study helps information workers to better understand the key factors affecting job satisfaction. The results of the analysis (Narang, 2010) showed that competitive excellence and fair and transparent management factors are more important than the other factors. According to the results of the analysis, repressive management and supervision and guidance were the factors attracting the least scrutiny. Interestingly, these two factors were statistically insignificant and negatively associated with the satisfaction variable. As a result of the regression analysis, the organizational support factor was also found to be a statistically insignificant factor and negatively related to the satisfaction of information workers. The relative importance of these five factors is ranked as follows: competitive perfectionism, fair and transparent management, organizational support, oppressive management practices, supervision and guidance.

To be competitive, the manufacturing sector must train and educate highly qualified and well-trained employees. These workers should not be full-fledged information workers, but closely qualified in comparison to them. DiGiovanni (2004) developed a "business simulation" that could be implemented at a plant that would be equally effective for employees at various levels and then implemented it in a factory setting so that employees could catch up to the level of information workers. In this way, managers and employees are trained together. Thanks to this method, management-employee relations have improved, and teamwork and excitement have increased. Through this training (DiGiovanni, 20014), a long-term understanding has been achieved. As a result of the implementation, employees perceived a link between individual decisions and

commercial business results. In the factory cited in the study, the management did not force change, instead seeking to create an environment that could be accepted and understood in the long run. As a result, it was determined that the necessary factor preventing employees' ability to reach the level of information workers is not continuous resistance, but resistance to change. It was also demonstrated empirically within the workshop that a different educational system is an important factor.

The effects of inward and outward motivation as determinants of the transfer of employees' knowledge were studied by Cruz, et al. (2009). According to the results of this study, it was found that information transfer was developed through intrinsic motivation, whereas the outward motivation factor was not significantly effective regarding knowledge transfer. Externally oriented motivation is exemplified by high quality individual and professional life. High-level autonomy in a beautiful working environment, strong commitment to work that allows employees to revitalize their professional development, and ethical and moral values of employees can be exemplified as the inward motivation. Due to the institutional affiliation created through inward motivation, it has been proposed that managers design a mechanism that will transform implicit (tacit) information into explicit information to ensure that the information remains within the organization. Transfer of knowledge, a key element in knowledge management, has been appreciated for its sustainable competitive advantage and its role in organizational productivity. Knowledge transfer within an organization allows employees to work together effectively. Therefore, information transfer is necessary for effective management. Managers are encouraged to provide motivation, both outwardly and inwardly, and to maximize the transfer of knowledge among their employees. Managers should encourage their employees to transfer knowledge to increase organizational productivity (Cruz, 2009). At the same time, employees must perceive that the institutions for whom they work are valued through the presentation of appropriate work conditions that enable the employees to progress both professionally and personally. Employees must have a sense of well-being and feel satisfied with their work. The relationship between factors such as autonomy, solidarity, team development, process and support has been examined, and the relationship between these factors and the activities of information workers teams has been further examined (Janz and Colquitt, 1997). According to the results of the examinations, the effect of interaction varies according to the type of autonomy applied. In teams with mature development, the relationship between work motivation and behavior such as helping, sharing and innovation has been seen to be highly positive. However, a positive relationship has been found between process behavior and effectiveness. Considering the positive relationship between activities of knowledge workers' teams and autonomy can be beneficial in practice. For example, managers can correctly identify the factors and processes that affect this relationship (Janz and Colquitt, 1997).

3. Methodology

In the study, knowledge workers among health care personnel were sorted into those employees that had acquired undergraduate, graduate, or doctoral degree graduates as defined in the literature. The binary classification was made so that institutional performance would be successful and unsuccessful. The SPSS- Modeler (v.18) modeling program was used for the application. IBM-SPSS (v.19) was used to transfer the data and to work successfully with the model. During the application, factors that determined the satisfaction of information workers were obtained by factor analysis as well as confirmatory factor analysis. The five-point Likert scale was used for the answers in the questionnaire to be 1 (strongly agree), 2 (agree), 3 (neutral), 4 (disagree), 5 (strongly disagree). The questions were rated from most positive to most negative. In this study, the questionnaire was posed by adapting scales from Zaim, H and Zaim, S. (2007) directly. However, the scale does not distinguish the underlying dimensions of job satisfaction. Thus, the methodology is focusing on investigating the underlying dimensions of job satisfaction among healthcare knowledge workers using factor analysis.

3.1. Data Collection

3.1.1 Sample

In this study, a dataset was obtained by way of a questionnaire applied to knowledge workers who graduated from Bachelor's, Master's, and Ph.D. programs and were still working in the health care sector. Questionnaires were sent to 500 knowledge workers in the health care field. 310 responded with a 62% response rate. A 50 of the participants chose the same value for the questions. To alleviate the response bias and its negative impact in the following analyses, these 50 records were removed from the sample (Furnham, 1986).

3.1.2 Data preprocessing

The raw data was subject to preprocessing steps which is an important phase prior to baseline analysis (Hair et al., 2019). Thus, the obtained sample is cleaned by removing any typos, converting the string values to numerical values such as the demographic variables, and preparing the data set for further analysis, and moving the data into the SPSS software environment. Of these participants, 14 had doctoral degrees, 139 had master's degrees and 96 had bachelor's degrees.

3.2 Exploratory Factor Analysis

The purified research sample is subject to factor analysis. A list of 34 items (questions) was used to measure the satisfaction of the knowledge workers in the health care sector. The items were not

categorized as factors prior to the analysis. Initially, the items with the related questions are shown in Table 1.

Table 1: Healthcare knowledge worker satisfaction survey questions with item number

Items	Survey questions
Item-1	I think the institution I work with values me.
Item-2	I know my job and the added value that I have provided.
Item-3	The institution I work with takes my ideas and opinions into account and values them.
Item-4	I think I have job security.
Item-5	I think you will not be put off unless you have a justifiable reason.
Item-6	I think that rise in the corporation and the reforms are done fairly.
Item-7	I believe that I have an opportunity to rise in the institution I work for.
Item-8	My managers are helping me to do my job better.
Item-9	I have the authority to do the job properly.
Item-10	My organization provided me with the required training as well as the opportunities to be able to do the job sufficiently.
Item-11	My managers keep providing feedback (positive and /or negative warnings and incentives).
Item-12	I do not intend to leave the institution I work for.
Item-13	I can do collective work with my colleagues.
Item-14	Cooperation between my colleagues and me is good.
Item-15	My colleagues are prone to teamwork.
Item-16	I can make joint decisions with my colleagues.
Item-17	We can talk to the manager without fear that our ideas will be rejected.
Item-18	Managers warn us when we make mistakes without threatening us.
Item-19	In general, we respect our managers.
Item-20	There is strong communication between employees.
Item-21	We can reach the person we need (including the managers) when we want.
Item-22	I am satisfied with the changes.
Item-23	I assume that salary policy is just.
Item-24	I am satisfied with non-monetary rewards.
Item-25	Overall, I am satisfied with my work.
Item-26	I am satisfied with the agency for whom I work.
Item-27	I think that the workplace environment for whom I work is suitable for physical work.
Item-28	I think that the workplace environment for whom I work is suitable in social terms (relationships, corporate culture, etc.).
Item-29	My managers encourage me to work very well.
Item-30	My colleagues encourage me to work very well.
Item-31	Overall, I am satisfied with the premiums and bonuses awarded, except for the fee.
Item-32	I am delighted with the social facilities that the institution has provided.
Item-33	My institution provides sufficient social benefits. I am satisfied with my current benefits (education, health, rent, etc.).
Item-34	I recommend other colleagues that I work with.

The number of samples used in factor analysis was 249. For analysis, 10 times the sample size of each latent variable is recommended (Nunnally, 1978). Therefore, the number of samples in our sample is quite larger than the minimum requirement for the analysis. Factor analysis was performed using IBM SPSS Modeler V.18 (IBM Corp, released 2018) and IBM SPSS Statistics v.20 (IBM Corp, released 2011) at the same time to obtain relevant results. Since Modeler V.12 was used throughout the analysis during the run, the results obtained here were analyzed. When comparison was made, the results obtained from both programs were similar to each other. The following adjustments have been made using the SPSS Modeler Factor analysis model. To obtain the factors, the "Principal Components" method was used as the extraction method. This is one of

the approaches used to determine the base dimension of a data set. The basic components decompose the analysis so that it is a set of original data linear variables. This defines what linear components are present in the data and how a given variable contributes to that component. Principal Component analysis is a robust method that is psychometric and less complex conceptually than other methods and is also preferred because it resembles many aspects of discriminant analysis (Field, 2009). To successfully evaluate the factor analysis, the Modeler factor analysis method was utilized to select the correlation matrix. The maximum number of iterations for the approach was 25; the eigenvalue for the extraction factor was 1.0; the factor of less than 0.4 was not shown in the factor load; therefore the "Varimax" option was used. Although different visual techniques such as "scree plot" were used in the factor selection, it is recognized that this is not enough.

It has been recommended to select factors that are greater than an eigenvalue value of 1. The eigenvalue refers to the amount of variation explained by a factor; 1 eigenvalue represents a significant amount of variation. For the factors to be distinguishable from each other, the rotation option must be applied. There are two types of factor rotation: orthogonal rotation and oblique rotation. In orthogonal rotation, the factors are kept independent of rotation. Before turning, all factors are independent, that is, they are not related to each other, and orthogonal rotation ensures that all these factors are unrelated. With oblique rotation, the factors must be related to each other. Theoretically, the factors are independent, i.e. they are not related to each other. In the study, orthogonal rotation was applied, considering that the factors were independent of each other, and "varimax" which is one of the vertical rotation techniques, was preferred. "Varimax" maximizes distribution within the factors, thus introducing a small number of variable loads and more easily interpretable factor clusters into each factor load.

3.3. Examination of Sample Size (KMO and Barlett's Test)

Another technique used for the adequacy of the sample used is the KMO (Kaiser-Meyer-Olkin) sampling adequacy criterion. According to the analysis result, the KMO sampling adequacy criterion was obtained as 0.945 (Table 2). According to Kaiser (1974), the KMO test value is rated as 0.5 and above is acceptable; between 0.5 and 0.7 is moderate; between 0.7 and 0.8 is good; between 0.8 and 0.9 is very good; 0.9 and above are superb for the KMO test value sampling capability. Accordingly, since the sample used in the study was rated at 0.945, the KMO test confirmed that the sample used was quite sufficient. We can be confident that the factor analysis fits into our data set.

Table 2: KMO and Bartlett's Test results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.945
Bartlett's Test of Sphericity	7367.661
df	561
Sig.	.000

The Bartlett criterion tests whether the original correlation matrix is a unit matrix. For the application of factor analysis, relationships between the variables must be demonstrated; if the R-matrix is an identity matrix, then all the correlation coefficients will be zero. Therefore, this test is significant with the requirement that the level of significance should be below 5%. The significant Bartlett test tells us that the R-matrix is not an identity matrix and that some relations exist between the variables. The Bartlett test obtained for this dataset was significant at a 1% significance level ($p < 0.0001$). Therefore, factor analysis was useful for data comparisons.

4. Findings

4.1. Results of Descriptive Statistics

A sample of 249 knowledge workers in health care participated in the survey. The descriptive statistical results are given in Table 3 which shows the sample distribution based on the demographic variables. The proportion of male participants was relatively higher than that of female participants. While the proportion of male participants was 50.6%, the rate of female participants was 49.4%. Also, 32.93% of the participants are staff nurses with at least bachelor's degrees, 6.43% are nurse administrators, 32.93% are mid-level healthcare managers, 6.83% are senior healthcare managers, and 20.88% are medical doctors. Moreover, 64.3% of the participants were married while 35.7% were single. Regarding the education level, 38.55% of the knowledge workers in the healthcare sector have an undergraduate degree, 55.82% have a master's degree, and 5.62% have a doctorate. Furthermore, the results reveal that 22.89% of the healthcare personnel had less than 5 years of experience, 28.51% had between 8 and 10 years, 20.88% had between 11 and 15 years, 16.87% had between 16 and 20 years, and 10.84% had more than 20 years of professional experience in the healthcare sector. The proportion of employees who have worked for a long time is relatively small. This may be because the participants, i.e. the knowledge workers in healthcare, formed a very young group. Age is another important demographic variable. The results show that 21.69% of the participants were younger than 30 years old, 55.82% were between 30 and 39 years old, 20.48% were 40 and 49 years old, 1.61% were between 50 and 59 years old, and only 0.40% were older than 60 years old. The results indicate that those who are older than the '60s are not willing to stay in the healthcare sector in this particular sample. The participants were asked if they chose the current profession voluntarily or involuntarily. The results

reveal that 61.4% chose their current job voluntarily and 29.3% chose it partially voluntarily while only 9.2% chose their profession unwillingly. Finally, the participants were asked if they receive any additional training or education for their current job: 60.64% indicated that they received additional training to perform well in their current job successfully while 39.36% indicated otherwise. In other words, knowledge workers in healthcare continuously receive extra training to continue in their current profession since the education received at the university cannot meet the requirements of the contemporary job skill requirements. Furthermore, the knowledge is dynamic which constantly changes; therefore, training received many years ago is not sufficient.

Table 3: Sample distribution based on demographic variables

Variable	Categories	Frequency	Percent
Gender	Male	126	50.60
	Female	123	49.40
	Total	249	100.00
Professional job position	Staff Nurse	82	32.93
	Nurse Administrator	16	6.43
	Mid-Level healthcare manager	82	32.93
	Senior healthcare manager	17	6.83
	Medical Doctor	52	20.88
Age	Total	249	100.00
	0-29	54	21.69
	30-39	139	55.82
	40-49	51	20.48
	50-59	4	1.61
	60 or older	1	0.40
Marital status	Total	249	100.00
	Single	89	35.7
	Married	160	64.3
Education level	Total	249	100
	Undergraduate degree	96	38.55
	Master's degree	139	55.82
	Doctorate	14	5.62
Experience	Total	249	100.00
	0-5 years	57	22.89
	6-10 years	71	28.51
	11-15 years	52	20.88
	16-20 years	42	16.87
	21 years or more	27	10.84
Choose your profession willingly	Total	249	100.00
	Yes	153.00	61.4
	No	23.00	9.2
	Partially	73.00	29.3
Received any additional training for your job	Total	249.00	100
	Yes	151	60.64
	No	98	39.36
	Total	249	100.00

Given the descriptive statistical information obtained, there were no missing values in the questions included for the factor analysis. Variable names from Item1 to Item 34 were given for

each question; the corresponding questions for these variables are shown in Table 4. The mean and standard deviation of each item (questions) are provided in Table 4. The results indicate that the minimum value of the items is one while the maximum value of the items is five. The highest mean value of the item is Item-2 and Item-5 while the lowest mean value of the items is Item-11 and Item-24. The average variability of the items around mean values are relatively small.

Table 4: Descriptive statistics results

Item ID	N	Minimum	Maximum	Mean	Std. Deviation
Item-1	249	1	5	3.45	1.23
Item-2	249	1	5	4.43	0.83
Item-3	249	1	5	3.53	1.19
Item-4	249	1	5	3.86	1.22
Item-5	249	1	5	4.13	1.14
Item-6	249	1	5	2.72	1.38
Item-7	249	1	5	3.05	1.34
Item-8	249	1	5	3.33	1.32
Item-9	249	1	5	3.50	1.24
Item-10	249	1	5	3.27	1.29
Item-11	249	1	5	3.26	1.29
Item-12	249	1	5	3.35	1.40
Item-13	249	1	5	3.76	1.11
Item-14	249	1	5	3.82	1.12
Item-15	249	1	5	3.61	1.22
Item-16	249	1	5	3.73	1.15
Item-17	249	1	5	3.67	1.21
Item-18	249	1	5	3.49	1.27
Item-19	249	1	5	3.89	1.11
Item-20	249	1	5	3.23	1.20
Item-21	249	1	5	3.77	1.16
Item-22	249	1	5	2.94	1.32
Item-23	249	1	5	2.60	1.38
Item-24	249	1	5	2.28	1.34
Item-25	249	1	5	3.61	1.11
Item-26	249	1	5	3.46	1.28
Item-27	249	1	5	3.57	1.33
Item-28	249	1	5	3.31	1.28
Item-29	249	1	5	3.07	1.32
Item-30	249	1	5	3.18	1.24
Item-31	249	1	5	2.24	1.34
Item-32	249	1	5	2.55	1.40
Item-33	249	1	5	2.38	1.42
Item-34	249	1	5	3.06	1.31

4.2. Eigenvector Values of Factors

Using the eigenvalues of the R-matrix, the components (eigenvectors) of the data were calculated. By default, IBM Modeler and SPSS Statistics used the Kaiser criteria to extract factors that were greater than 1 in essence. Table 5 shows the post-extraction eigenvalue of each component before

and after extraction. According to the results obtained, the first factor had 47.45% of the total variance, the second factor 9.28%, the third factor 5.48%, the fourth factor 4.18%, the fifth factor 1.42%, and the last factor 2.71%. Because of the effect of optimizing the rotation factor constructs, the total variance explanatory rates of the factors after rotation were as follows: 17.78%, 15.97%, 15.23%, 12.15%, 7.12%, and 4.17%. The cumulative percentage of the variance is 72.43 which is significantly higher than the suggested value of 50% (Hair et al., 2019).

Table 5: Eigenvalues and the explained total variance of the extracted factors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	16.13	47.45	47.45	16.13	47.45	47.45	6.05	17.78	17.78
2	3.15	9.28	56.73	3.15	9.28	56.73	5.43	15.97	33.76
3	1.86	5.48	62.21	1.86	5.48	62.21	5.18	15.23	48.98
4	1.42	4.18	66.39	1.42	4.18	66.39	4.13	12.15	61.14
5	1.13	3.33	69.72	1.13	3.33	69.72	2.42	7.12	68.26
6	0.92	2.71	72.43	0.92	2.71	72.43	1.42	4.17	72.43

4.3. Determining the underlying factors of the job satisfaction of the healthcare knowledge workers

The factor analysis is performed for the 34 items of the job satisfaction for the healthcare knowledge workers. Toward this goal, the principal component analysis, varimax with Kaiser Normalization as the rotation method, Eigenvalue of 1 as the cut-off value for extracting the underlying factors, and finally 25 as the maximum iteration for convergence are used during the factor analysis. The orthogonal rotation approach of Varimax was used since the assumption that there was no theoretical relationship between the factors and the fact that they are independent of each other.

According to Stevens (1992), for easy interpretation of the factors, any values of factor loading less than 0.4 should not be included in the table. Six factors were extracted following the factor analysis. The variables were listed according to the magnitude of factor loadings. The results revealed that the results of factor analysis were composed of six factors in the study including 33 items in the healthcare knowledge worker satisfaction survey after one question was removed because it did not constitute a significant factor. Item-2 was removed from the analysis since it has a significantly low factor loading. Thus, 33 items are left for the factor analysis for determining the underlying factors.

Relevant variables and related factors are shown in the given table. There are six factors: the attitude of management, organizational support, job security, reward and pay, working conditions,

the attitude of colleagues. The factor of Management Attitude had six items, Organizational Support had five items, Job security had two items, reward and pay had six items, working conditions had nine items, and the colleagues' attitude had five items. Initially, Item2 had a low factor loading. After the factor analysis steps were repeated with thirty-three variables by removing Item-2, the relevant results were obtained as shown below in Table 6.

Table 6: Determination of Knowledge Worker's Satisfaction Factors

Items	Factor-1	Factor-2	Factor-3	Factor-4	Factor-5	Factor-6
Item 11	0.886					
Item 29	0.878					
Item 8	0.873					
Item 18	0.824					
Item 19	0.807					
Item 17	0.714					
Item 32		0.850				
Item 1		0.812				
Item 33		0.806				
Item 10		0.762				
Item 3		0.749				
Item 4			0.903			
Item 5			0.903			
Item 22				0.848		
Item 23				0.839		
Item 31				0.835		
Item 24				0.812		
Item 6				0.759		
Item 7				0.650		
Item 26					0.883	
Item 34					0.857	
Item 28					0.849	
Item 25					0.798	
Item 20					0.757	
Item 9					0.730	
Item 12					0.725	
Item 21					0.715	
Item 27					0.648	
Item 14						0.936
Item 15						0.934
Item 13						0.923
Item 16						0.923
Item 30						0.792

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Finally, the extracted factors with the items are summarized in Table 7. The list of the extracted variables and the detailed explanation of the items are re-organized and placed in a tabular form. We can easily see that the face validity of the factor analysis is met since the loaded items with the given name of the extracted factors make sense and are meaningful (Hair et al., 2019).

Table 7: Six extracted factors with corresponding items

Factor	Item
Management's attitude	My managers keep providing feedback (positive and /or negative warnings and incentives). My managers encourage me to work very well. My managers are helping me to do my job better. Managers warn us when we make mistakes without threatening us. In general, we respect our managers. We can talk to the manager without fear that our ideas will be rejected.
Organizational support	I am delighted with the social facilities that the institution has provided. I think the institution I work with values me. My institution provides sufficient social benefits (education, health, rent, etc.). I am satisfied with my current benefits. My organization provided me with the required training as well as the opportunities to be able to do the job sufficiently. The institution I work with takes my ideas and opinions into account and values them.
Job security	I think I have job security. I think you will not be put off unless you have a justifiable reason.
Reward & pay	I am satisfied with the changes. I assume that salary policy is just. Overall, I am satisfied with the premiums and bonuses awarded, except for the fee. I am satisfied with non-monetary rewards. I think that rise in the corporation and the reforms are done fairly. I believe that I have an opportunity to rise in the institution I work for.
Working conditions	I am satisfied with the agency for whom I work. I recommend other colleagues that I work with. I think that the workplace environment for whom I work is suitable in social terms (relationships, corporate culture, etc.). Overall, I am satisfied with my work. There is strong communication between employees. I have the authority to do the job properly. I do not intend to leave the institution I work for. We can reach the person we need (including the managers) when we want.
Colleagues' attitude	I think that the workplace environment for whom I work is suitable for physical work. Cooperation between my colleagues and me is good. My colleagues are prone to teamwork. I can do collective work with my colleagues. I can make joint decisions with my colleagues. My colleagues encourage me to work very well.

According to the factor analysis results, 33 variables were collected under six factors. The results of the SPSS Modeler (v.12) were also compared with IBM SPSS (v.19) program. The findings were found to overlap with each other.

4.4. Reliability Analysis

Reliability indicates the consistency of measurement. Therefore, reliability analysis with Cronbach's Alpha was performed in the study to measure the consistency of survey questions. To

check the validity of the questionnaire used in the study, it was useful to check the reliability of the scale used in the factor analysis (Field, 2009). In the IBM SPSS v.19 environments, the "Cronbach's alpha" method was used for reliability analysis. First, all variables (thirty-three) were analyzed and the Cronbach's Alpha value was found. Then, Cronbach's alpha values were separately analyzed for five factors which were obtained as a result of factor analysis. If more than one factor is available, it is recommended that reliability analysis be done separately for each factor. Field (2009) notes that the reliability of a questionnaire is good if the Cronbach's Alpha value is 0.7, and very good if it is 0.8 and above. As a result of the reliability analysis for all variables, the Cronbach's Alpha value was found to be 0.97 (Table 7). Since this value is well above the recommended threshold value, we can state that the scale of the survey questions used in the analysis was reliable.

Table 8: Reliability analysis analysis for all variables

Cronbach's Alpha	No. of Items
0.96	33

Since there was a suggestion that the reliability of all factors to be analyzed should be one by one, the five factors of reliability were analyzed and Cronbach's alpha values of each were obtained as follows (Table 8):

Table 9: Reliability analysis

Factor ID	Factor name	Cronbach's alpha
Factor-1	Management's attitude	0.911
Factor-2	Organizational support	0.843
Factor-3	Job security	0.772
Factor-4	Reward & pay	0.880
Factor-5	Working conditions	0.915
Factor-6	Colleagues' attitude	0.941

4.5. Confirmatory Factor Analysis

Further factor analysis is performed following the exploratory factor analysis. Toward this end, confirmatory factor analysis is utilized. Therefore, the six extracted factors with 33 items were subject to confirmatory factor analysis. Regarding the methodology, the maximum likelihood (ML) approach is used to evaluate the validity of six constructs. Accordingly, the results with standardized regression weights, T-statistics, p-value, and the model-fit measures are given in Table 9. The results of the fit measures are as follows: goodness of fit measures are $\chi^2_{(df=441)} = 1059.65, p < .001$; $\chi^2/df = 2.403$; goodness of fit index (GFI) = .80; normed fit index (NFI) = .90;

comparative fit index (CFI)= .91; relative fit index (RFI)= .90; incremental fit index (IFI)=.91; Tucker-Lewis index (TLI)=.90; and root mean square error of approximation (RMSEA)= .054. The results of the confirmatory factor analysis show that the fit measures are sufficient or above the cut-off values. Thus, sufficient evidence of good models as suggested by Hu and Bentler (1999) are met. The standardized regression weights of the items are all statistically significant (p-value<0.001) in the analysis results. Finally, the results reveal that the convergent validity is satisfied since the items are statistically significantly loaded to their respective latent variables.

Table 10: Confirmatory Factor Analysis

Factors	Items	Standardized Regression Weights	T-stat.	P-value
Management's attitude	Item 29	0.891	Scaling	
	Item 19	0.744	14.848	***
	Item 18	0.731	14.37	***
	Item 17	0.645	10.891	***
	Item 11	0.849	18.947	***
	Item 8	0.843	18.644	***
Organizational support	Item 33	0.579	Scaling	
	Item 32	0.664	15.087	***
	Item 3	0.703	8.414	***
	Item 10	0.705	8.945	***
	Item 1	0.741	9.273	***
Job security	Item 5	0.825	Scaling	
	Item 4	0.764	7.147	***
Reward and pay	Item 31	0.789	Scaling	
	Item 24	0.707	14.686	***
	Item 23	0.772	11.309	***
	Item 22	0.778	11.447	***
	Item 7	0.8	9.268	***
	Item 6	0.824	10.838	***
Working conditions	Item 34	0.847	Scaling	
	Item 28	0.781	15.131	***
	Item 27	0.548	9.365	***
	Item 26	0.817	19.03	***
	Item 25	0.712	13.192	***
	Item 21	0.7	12.897	***
	Item 20	0.772	13.124	***
	Item 12	0.685	13.879	***
	Item 9	0.724	11.931	***
	Item 30	0.725	Scaling	
Colleagues' attitude	Item 16	0.885	14.235	***
	Item 15	0.908	14.553	***
	Item 14	0.926	14.792	***
	Item 13	0.916	14.541	***

$\chi^2_{(df=441)} = 1059.65, p < .001$; $\chi^2/df= 2.403$; GFI= .80; NFI= .90; CFI= .91; RFI= .90; IFI=.91; TLI=.90; RMSEA=.054.

***p<0.001.

5. Conclusion and Discussion

Healthcare knowledge workers' employee information was studied in detail. Despite the absence of an absolute definition, the widely used definitions and explanations of researchers engaged in both theoretical and experimental work were provided. After looking at the concept of overall employee satisfaction, any factors influencing satisfaction were examined. Likewise, factors affecting the satisfaction of healthcare knowledge workers were discussed. The dataset used in the study was obtained from a questionnaire circulated to the healthcare knowledge workers in the province of Istanbul, Turkey. There were 249 responses received from the healthcare personnel. Therefore, there are 249 records of healthcare knowledge workers in the data set. Using the questionnaire, the underlying dimensions of job satisfaction among the healthcare knowledge workers were investigated with 34 variables. Of these variables, 33 items were used to measure the satisfaction of knowledge workers. The answers to the questionnaire were evaluated using the five Likert scale: one represents "Strongly agree", two represents "Agree", three represents "Neutral", four represents "Agree", and five represents "Strongly agree". The result matrices related to the KMO sample consistency measurement and Bartlett's test were examined in order to test the appropriateness of the factors related to the satisfaction of the knowledge workers by using the obtained survey data, as well as the factor analysis as a statistical analysis method. According to these results, exploratory factor analysis was determined to be an appropriate statistical method. The validity and reliability of the scale applied for the relevant variables measuring the satisfaction of knowledge workers were also tested. In order to examine the scale's validity, factor analysis as well as the value of Cronbach's Alpha were applied in order to test the reliability. After confirmation through the test results that factor analysis was an appropriate statistical method, the analysis method was applied to the questionnaire data, and the six critical factors that knowledge workers must have were obtained. These factors are; the attitude of management, pay and reward, the attitude of colleagues, working conditions, job security, and organization support. The critical factors that should be in knowledge workers were determined with the help of exploratory factor analysis. The results of the study are important in terms of determining factors that should be considered for success within institutions. Confirmatory factor analysis was also utilized to ensure further validity issues such as discriminant validity. The obtained factors are consistent with the findings of the prior studies in the literature (Delen et al., 2013; Kuzey, 2012; Kuzey, 2018).

6. Future Research and Limitation

Although this research paper focused on the underlying dimensions of the job satisfaction among the healthcare knowledge workers, it can be studied further by including various latent variables to be tested. The positive linear relationship of the obtained factors of the job satisfaction on the

financial performance, non-financial performance, or individual performance of the healthcare knowledge workers can be studied. Toward this end, either Covariance Based Structural Equation Modeling or Partial Squares Least Structural Equation Modeling methodologies can be utilized it.

Regarding the limitation, primary data source was utilized in this study. The author collected the data set and investigated the problem in this paper. However, the sample size is relatively small since it was difficult to access the healthcare personnel easily. Furthermore, the time to collect the data among the healthcare workers took a long time to complete the project. Therefore, future studies can elaborate this study using a larger sample size.

References

Anderson, C. H. (1984). Job design: Employee satisfaction and performance in retail stores. *Journal of Small Business Management*, 22(000004), 9-16, ISSN: 0047-2778.

Cruz, N. M., V. M. Perez, C. T. Cantero. (2009). The influence of employee motivation on knowledge transfer. *Journal of Knowledge Management*, 13(6), 478-490, <https://doi.org/10.1108/13673270910997132>.

Delen, D., Zaim, H., Kuzey, C., & Zaim, S. (2013). A comparative analysis of machine learning systems for measuring the impact of knowledge management practices. *Decision Support Systems*, 54(2), 1150-1160, <https://doi.org/10.1016/j.dss.2012.10.040>.

Dickter, D. N., Roznowski, M., & Harrison, D. A. (1996). Temporal tempering: An event history analysis of the process of voluntary turnover. *Journal of Applied Psychology*, 81(6), 705, DOI:10.1037/0021-9010.81.6.705.

DiGiovanni, M. (2004). Developing Knowledge Workers on the Factory Floor. *Development and Learning in Organizations*, 18(4), 10-12, <https://doi.org/10.1108/14777280410544556>.

Drucker, P. (1959). The Landmarks of Tomorrow. New York, NY: Harper & Row, doi:10.2307/2088600.

Drucker, P. (1999). Knowledge-worker productivity: the biggest challenge. *California Management Review*, 41(2), 79-85, <https://doi.org/10.2307/41165987>.

Ersel, B. (2003). Bilgi çağında çalışma ilişkileri ve beyin göçü. II. Ulusal Bilgi, Ekonomi ve Yönetim Kongresi, Bildiriler Kitabı, Derbent-İzmit, 709-721.

Field, A. (2009). Discovering statistics using SPSS. Sage publications, doi:10.1002/bjs.7040.

Furnham, A. (1986). Response bias, social desirability and dissimulation. *Personality and individual differences*, 7(3), 385-400, [https://doi.org/10.1016/0191-8869\(86\)90014-0](https://doi.org/10.1016/0191-8869(86)90014-0).

Hair Jr, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis*. Cengage Learning.

Horvath, D. (2006). Knowledge worker definition. <http://http://searchcrm.techtarget.com/definition/knowledge-worker.html> (05/03/2011)

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, 6(1), 1-55, <https://doi.org/10.1080/10705519909540118>.

IBM Corp. (Released 2011). IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.

IBM Corp. (Released 2019). IBM SPSS Modeler for Windows, Version 18.2. Armonk, NY: IBM Corp.

Ilies, R., & Judge, T. A. (2004). An experience-sampling measure of job satisfaction and its relationships with affectivity, mood at work, job beliefs, and general job satisfaction. *European journal of work and organizational psychology*, 13(3), 367-389, <https://doi.org/10.1080/13594320444000137>.

Janz, B. J., Colquitt, (1997). Knowledge Worker Team Effectiveness. *Personnel Psychology*, 50(4), 55-62.

Kaiser, H.F. (1974). An Index of Factorial Simplicity. *Psycometrika*, 39, 31-36, <https://doi.org/10.1007/BF02291575>.

Kelley, R. E. (1990). Managing the new workforce. *Machine Design*, 62(9), 109-113.

Kelloway, E. K. , Barling J. (2000). Knowledge work as organizational behavior. *International Journal of Management Reviews*.2(3), 287-304, <https://doi.org/10.1111/1468-2370.00042>.

Kolo, E. S. (2018). Job satisfaction among healthcare workers in a tertiary center in kano, Northwestern Nigeria. *Nigerian Journal of Basic and Clinical Sciences*, 15(1), 87, DOI: 10.4103/njbcns.njbcns_31_17.

Kuzey, C. (2012). Veri madenciliğinde destek vektör makinaları ve karar ağaçları yöntemlerini kullanarak bilgi çalışanlarının kurum performansı üzerine etkisinin ölçülmesi ve bir uygulama. *Yayınlanmamış Doktora Tezi*, İstanbul Üniversitesi Sosyal Bilimler Enstitüsü, İstanbul.

Kuzey, C. (2018). Impact of health care employees' job satisfaction on organizational performance support vector machine approach. *Journal of Economics and Financial Analysis*, 2(1), 45-68, DOI: <http://dx.doi.org/10.1991/jefa.v2i1.a12>.

Lang, J. C. (2001). Managerial Concerns in Knowledge Management. *Journal of Knowledge Management*, 5(1), 46-47, <https://doi.org/10.1108/13673270110384392>.

Locke, E. A. (1976). The nature and causes of job satisfaction. In MD Dunnette. *Handbook of industrial and organizational psychology*, 1297-1349.

Locke, E.A. (1969). What is job satisfaction? *Organizational Behavior and Human Performance*, 4(4), 309-336, [https://doi.org/10.1016/0030-5073\(69\)90013-0](https://doi.org/10.1016/0030-5073(69)90013-0).

Malhotra, Y. (1998). Knowledge Management, Knowledge Organizations, Knowledge Workers. www.brint.com/interview/maeil.htm, (03/03/2011).

Mengistu, M. M., & Bali, A. G. (2015). Factors associated to job satisfaction among healthcare workers at public hospitals of west Shoa zone, Oromia regional state, Ethiopia: a cross

sectional study. *Science Journal of Public Health*, 3(2), 161-167, doi: 10.11648/j.sjph.20150302.12.

Morris, B. (1998). The Service Profit Chain: How Leading Companies Link Profit and Growth to Loyalty, Satisfaction, and Value. *International Journal of Service Industry Management*, 9(3), 312-313, <https://doi.org/10.1108/ijsim.1998.9.3.312.3>.

Narang, R., & Dwivedi, A. (2010). Managing the job satisfaction of knowledge workers: an empirical investigation. *Asia Pacific Journal of Business and Management*, 1(1), 1-14.

Nunnally, J.C. (1978). *Psychometric Theory*, New York: McGraw-Hill.

Prince, W.W. (2021). *Knowledge Workers*.
<http://www.referenceforbusiness.com/management/Int-Loc/Knowledge-Workers.html>
(08/30/2021)

Saravananmuthu, K. (2004). Gold-Collarism in the Academy: The Dilemma in Transforming Bean-Counters into Knowledge Consultants. *Critical Perspectives on Accounting*, 15, 580-589, [https://doi.org/10.1016/S1045-2354\(03\)00048-0](https://doi.org/10.1016/S1045-2354(03)00048-0).

Spector, P.E. (1997). *Job Satisfaction: Application, Assessment, Causes, and Consequences*. Thousand Oaks, CA: Sage, ISBN:9780761989233.

Stevens, J.P. (1992). Applied Multivariate Statistics for the Social Sciences. Hillsdale, NJ: Earlbaum.

Stewart, T.A. (1997). Intellectual Capital: The New Wealth of Organizations, New York: Doubleday, ISBN:9780307765857.

Syptak, J.M., Marsland, D.W., and Ulmer, D. (1999). Job satisfaction: Putting theory into practice. *Family Practice Management*. <http://www.aafp.org/fpm/991000fm/26.html>
(01/02/2011).

Teas, K.R.. (1981). A Test of a Model of Department Store Salespeople's Job Satisfaction. *Journal of Retailing*, (67), 3-25, ISSN:0022-4359.

Weiss, H. (2002). Deconstructing job satisfaction: separating evaluations, beliefs and affective experiences. *Human Resource Management Review*. (12), 173-94, [https://doi.org/10.1016/S1053-4822\(02\)00045-1](https://doi.org/10.1016/S1053-4822(02)00045-1).

Zaim H., S. Zaim. (2007). The Impacts of Tacit Knowledge on Organizations' Performance. *6'th International Congress on Knowledge, Management and Economy*, İstanbul, Turkey, 94-102.

Zhang, S. X., Liu, J., Jahanshahi, A. A., Nawaser, K., Yousefi, A., Li, J., & Sun, S. (2020). At the height of the storm: Healthcare staff's health conditions and job satisfaction and their associated predictors during the epidemic peak of COVID-19. *Brain, behavior, and immunity*, 87, 144-146, DOI: 10.1016/j.bbi.2020.05.010.